Antiterrorism and Force Protection Considerations in Facility Design

DoD Minimum Antiterrorism Standards for Buildings

Tri-Services Cost Conference

3-6 June 2003

US Army Corps of Engineers

Naval Facilities Engineering Command

TOPICS

1. Background of DoD Standards
2. Criteria and Guidance
3. DoD Minimum AT Standards for Buildings
4. Site Development Issues and Examples
5. Questions

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Background of DoD Standards

- CJCS directed J-34 to take lead in development and implementation of AT/FP construction standards
- Dec ’98 Joint Service Security Engineering Working Group (SEWG) tasked to provide technical support and coordination
- DoD Directive 2000.12 requires that Military Departments establish military and minor construction programming policies to ensure that AT/FP features are included in the planning, design, and execution of construction projects.
- The Primary Purpose is to protect Personnel by reducing the risk of mass casualties.

Background of DoD Standards

Security Engineering Working Group (SEWG) Participants

- Joint Staff J-34 (Now J-3, Deputy Directorate for AT/FP)
- U.S. Army
  - Headquarters, Corps of Engineers (USACE)
  - USACE Protective Design Center
- U.S. Navy
  - NAVFAC Engineering Innovation and Criteria Office (EICO)
  - Naval Facilities Engineering Service Center (NFESC)
  - Naval Criminal Investigative Service (NCIS / N-34)
- Headquarters U.S. Marine Corps (Jane Brattain)
- U.S. Air Force
  - Civil Engineer Support Agency (AFCESA)
- Other Defense Agencies (NEXCOM, NPC, DECA, DTRA, DDESB)

DoD Philosophy

- Comprehensive protection is cost prohibitive
- Appropriate level of protection can be provided to lessen risk of mass casualties for all DoD personnel
- Three key elements
  - Time:
    - Must be in place at time of attack
    - Least expensive time for application is in construction / major renovation
  - Master planning:
    - Long term “blueprint” for installations. Begin a long migration towards a full inventory of protected facilities
    - Invest funds only in adequate facilities
  - Design and Construction Practice:
    - Concepts to be incorporated into standard design practice
    - Must be coordinated with security operations

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Criteria and Guidance

DOD REQUIREMENTS

- DOD 2000.12 - DoD Combating Terrorism Program

  "‥ requires that Military Departments establish military and minor construction programming policies to ensure that AT/FP features are included in the planning, design, and execution of construction projects."

- DOD 2000.12H - Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence
- DOD 2000.16 - DoD Combating Terrorism Program Standards
- Various "Military Department" specific instructions/directives relating to AT/FP requirements

Criteria and Guidance

Selection of DoD Design Criteria

- UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings
- UFC 4-010-10, DOD Minimum Antiterrorism Standoff Distances for Buildings (FOUO)
- MIL-HDBK 1013/1A - Design Guidelines for Physical Security of Facilities (Latest revision will be a Unified Facility Criteria -UFC)
- MIL-HDBK-1013/10 - Design Guidelines for Security Fencing, Gates, Barriers and Guard Facilities
- MIL-HDBK-1013/12 - Evaluation and Selection Analysis of Security Glazing for Protection Against Ballistic, Bomb and Forced Entry Tactics
- MIL-HDBK-1013/14 - Selection and Application of Vehicle Barriers
- Various Tech Data Sheets, Users Guides, Interim Guidance, etc.

Criteria and Guidance

WEBSITES

UFC'S // MILITARY HANDBOOKS // USER'S GUIDES // TDS // ALL DOD AND SECNAV INST // ARMY // AIR FORCE:

- http://navfacilitator.navfac.navy.mil/cheng/enet/tdls/security/security.cfm

All UFC'S can be found on UFC Consolidated Index website:

- http://65.204.17.188//report/doc_ufc.html
- http://criteria.navfac.navy.mil/ (EICO WEBSITE)

Criteria and Guidance

AT/FP CRITERIA-UNIFIED FACILITY CRITERIA (UFC)

DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01

DOD Minimum Antiterrorism Standoff Distances for Buildings, UFC 4-010-10 (FOUO)

DOD Design and O&M: Mass Notification Systems, UFC 4-021-01

New DoD Security Engineering Manuals (SEM):

UFC 4- 011- 01 Security Engineering Planning Manual (FOUO)

UFC 4- 011- 02 Security Engineering Design Manual

Security Engineering Manual Volumes 1 – 4

TM 5-853-1, Volume 1 - Security Engineering Project and Cost Development

TM 5-852-2, Volume 2 - Security Engineering Project Concept Design

TM 5-852-3, Volume 3 - Security Engineering Project Final Design

TM 5-852-4, Volume 4 - Security Engineering Project Electronic Security Design

22 Supporting UFCs for Planning and Design

(Entry/Access Control, Vehicle Barriers, Blast Resistant Construction, Progressive Collapse, Windows and Doors, Mail rooms, PSE, CBRN Collective Protection, various others.)

UFC 4- 012 – 01 through UFC 4- 012 - 22

Criteria and Guidance

"For Official Use Only"

Many of the criteria documents (or portions) are marked **FOR OFFICIAL USE ONLY**, FOUO

FOUO - US Government agencies and/or their contractors

- No posting to INTERNET (Web sites that are open to public access).
- Construction plans and specifications have limitations
- Design/Build contracts will take more up-front preparation
  - FOUO documents should not be made a part of request For Proposal

DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01

DOD Minimum Antiterrorism Standoff Distances for Buildings, UFC 4-010-10 **(FOUO)**

- explosive weights to be used for mitigating standoff distance

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"Final" DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

20 SEP 2002

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DOD FIELD ACTIVITIES
DIRECTOR FOR LOGISTICS, JOINT STAFF (J-4)

SUBJECT: Department of Defense Minimum Antiterrorism Standards for Buildings

An important element of our "War Against Terrorism" is the ability of Defense facilities to protect our people. As a result of a collaborative effort of representatives from the Services and numerous Defense agencies, the Department of Defense now has a new Unified Facilities Criteria (UFC), "DoD Minimum Antiterrorism Standards for Buildings."

The attached UFC assigns responsibilities and prescribes procedures for including antiterrorism construction standards in new construction, major renovations, and leases of DoD buildings. Later this year, a more detailed DoD Manual for Security Engineering will be published.

This UFC supersedes the interim standard issued in December 1999 and referenced in DoD Instruction 2000.16, "DoD Antiterrorism Standards." The UFC applies to all DoD Components.

E.C. Aldridge, Jr.

Attachments:
As stated

UFC 4-010-01
31 July 2002

UNIFIED FACILITIES CRITERIA (UFC)

DoD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS

DISTRIBUTION STATEMENT A: Approved for Public Release;
Distribution is unlimited.

DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01

- Focused on terrorist threat (even where there is NO define threat)
- Minimum standards:
  - Designed to reduce the risk and possibility of mass casualties due to a terrorist attack (CBRN**E**) – Primarily focused on "E" - Explosive event.
  - Minimize collateral damage from explosive effects and fragmentation
  - Facilitate future upgrades and increases in FPCON
- Predicated on maintenance of minimum standoff distances to allow for use of conventional construction
  - Where standoff distance cannot be met, a comparable level of protection must be provided through mitigation
- Applies to construction from all appropriations
- Applies to new and existing construction, expeditionary and temporary construction ***plus leases***
- Includes ***requirements*** and ***recommendations***
- Mandatory "Minimum" standard for DoD facility design and construction

DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01 (Continued)

- Defers to DoD Security Engineering Manual for design strategies
- Defers to DoD Security Engineering Manual for costs
- Defers to Service and DoD guidance for DD Form 1391 preparation

Currently being rewritten

Security Engineering Manual Volumes 1 – 4

TM 5-853-1, Volume 1 - Security Engineering Project and Cost Development

TM 5-852-2, Volume 2 - Security Engineering Project Concept Design

TM 5-852-3, Volume 3 - Security Engineering Project Final Design

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Content of Standard

DOD Minimum Antiterrorism Standards for Buildings, UFC 4-010-01

- Chapter 1: Introduction
  - General Intent
  - Responsibility
  - Levels of Protection
  - Applicability
  - Programming
  - Information Sensitivity
- Chapter 2: Philosophy, Design Strategies, and Assumptions
- Appendix A: Definitions
- Appendix B: DoD Antiterrorism Construction Standards for New and Existing Buildings
- Appendix C: Recommended Additional Antiterrorism Measures for New and Existing Buildings
- Appendix D: DoD Construction Standards for Expeditionary and Temporary Structures

Program Applicability

- Program Year FY04 and beyond
- All new construction of inhabited buildings - regardless of fund sources
- Existing building (uninhabited and inhabited)
  - If “triggers” activated
  - No action required for other buildings!
- Leases (FY06 New - FY10 Renewal)
- All DoD components, All locations regardless of threat
- May be augmented based on:
  - CINC standards, Risk and threat analysis, & Commanders’ directives

Categories of Facilities & Definitions

Three Basic Categories of Facilities:

- Inhabited Structures
- Primary Gathering Structures
- Troop Billeting Structures

Definitions:

- DOD Personnel: Military, family, civilian employees, contractors in our buildings
- DOD Building: Any building used by DOD personnel & owned, controlled, leased, managed by/for DOD
- Routinely Occupied: Any established or predictable pattern of use
- Controlled Perimeter: Physical boundary where personnel & vehicle access is controlled

Categories of Facilities

- **Inhabited Building:** ***Buildings or portions of buildings routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 40 square meters (430 square feet.)*** This density generally excludes industrial, maintenance, and storage facilities except for more densely populated portions of those buildings such as administrative areas. ***It also excludes family housing with 12 or fewer units per building.*** The inhabited building designation also applies To expeditionary and temporary structures with similar population densities. ***In a building that meets the criterion of having 11 or more personnel, with portions that do not have sufficient population densities to qualify as inhabited buildings, those portions that have sufficient population densities will be considered inhabited buildings while the remainder of the building may be considered uninhabited,*** subject to provisions of these standards. An example would be a hangar with an administrative area within it. The administrative area would be treated as an inhabited building while the remainder of the hangar could be treated as uninhabited. (Note: This definition differs significantly from the definition for inhabited building used by DoD 6055.9-STD and is not construed to be authorization to deviate from criteria of DoD 6055.9-STD.)

Categories of Facilities

- **Primary gathering building**: Inhabited buildings routinely occupied by 50 or more DoD personnel and family housing with 13 or more family units per building. ***This designation applies to the entire portion of a building that meets the population density requirements for an inhabited building. For example, an inhabited portion of the building that has an area within it with 50 or more personnel is a primary gathering building for the entire inhabited portion of the building.*** The primary gathering building designation also applies to expeditionary and temporary structures with similar population densities.

- Indoor Recreation Facilities
- Medical Facilities
- Office Buildings
- Training Facilities

Categories of Facilities

- **Billeting** : ***Any building or portion of a building in which 11 or more unaccompanied DoD personnel are routinely housed. For the purposes of these standards, billeting will also include Temporary Lodging Facilities and military family housing permanently converted to unaccompanied housing.*** Billeting also applies to expeditionary and temporary structures with similar population densities and functions.

- Enlisted Barracks
- Trainee Barracks
- Transient Unaccompanied Personnel Housing
- Unaccompanied Enlisted/NCO/Officer Quarters

"Triggers" for Existing Structures

- Major investments: Costs for renovation, modification, or repair at least 50% of building replacement cost
- Conversion of use: When any portion of a building is modified from its current use to that of an inhabited building, billeting, or a primary gathering building for one year or more
- Glazing replacement: For all glazing replacements in inhabited buildings
- Building additions: If addition is 50% or more of the gross area of the existing building – Existing building must meet Standards

Lease Applicability

- New leases after 1 Oct 05
- Lease renewals after 1 Oct 09
- Partial Occupancy
  - Only applies if DoD occupies 25% of building
  - Only applies to DoD area of building
- New building > Standards for new construction
- Existing Buildings > New leases, lease renewal > Standards for existing construction

Exemptions

- Family housing with 12 units or fewer per building
- Stand alone franchised food operations*
- Stand alone Shoppettes and mini marts*
- Gas stations and car care centers
- Medical Transitional structures and spaces*
- Recruiting Stations in Leased Spaces
- Other Transitional Structures and Spaces*

* Exempt from standoff distances to parking and roadways. All other standards apply.

Protective Measures

- **Minimum measures**
  - Apply to all construction regardless of threat
    - Baseline threat (non FOUO definition):
      - Modest bomb outside controlled perimeter
      - Smaller bomb inside controlled perimeter (vehicle or hand delivered)
      - Some direct and indirect fire weapons
      - Some Chemical, Biological and Radiological (CBR)
      - Fire (listed as a threat but no new design requirements)
  - Different for “inhabited structures” and “troop billeting and primary gathering facilities”
  - Typically add 1% to 5% to building cost where standoff distance is met

- **Threat specific measures (above baseline threat)**
  - Mitigate specific threats to various levels of protection
  - To be developed using DoD Security Engineering Manual (currently being rewritten/updated)

Design Strategies

- Maximize standoff distance
  - Minimum standoff distances must be met even if the building is hardened
  - Requires effective site layout and security controls
- Prevent building collapse
- Minimize hazardous flying debris
- Provide effective building layout
- Limit airborne contamination
- Provide mass notification (UFC 4-021-01)
- Facilitate future upgrades

Assumptions

- Baseline threat
  - Modest bomb outside controlled perimeter
  - Smaller bomb inside controlled perimeter (vehicle or hand delivered)
  - Direct and indirect fire weapons
  - Some Chemical, Biological, and Radiological (CBR) attacks
  - Fire (listed as a threat but no new design requirements)
- Controlled and uncontrolled perimeter
- Levels of protection
- Minimum Standoff Distances
  - Conventional Construction Standoff
  - Effective Standoff Distance

Levels of Protection

- Primary gathering and Billeting
  - Low
- Other inhabited buildings
  - Very low
- Protection only effective for the baseline threats

Levels of Protections – New Buildings

Table 2-1 Levels of Protection – New Buildings

Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Below AT standards	Severely damaged. Frame collapse/massive destruction. Little left standing.	Doors and windows fail and result in lethal hazards	Majority of personnel suffer fatalities.
Very Low	Heavily damaged - onset of structural collapse: Major deformation of primary and secondary structural members, but progressive collapse is unlikely. Collapse of non-structural elements.	Glazing will break and is likely to be propelled into the building, resulting in serious glazing fragment injuries, but fragments will be reduced. Doors may be propelled into rooms, presenting serious hazards.	Majority of personnel suffer serious injuries. There are likely to be a limited number (10% to 25%) of fatalities.
Low	Damaged – unrepairable. Major deformation of non-structural elements and secondary structural members and minor deformation of primary structural members, but progressive collapse is unlikely.	Glazing will break, but fall within 1 meter of the wall or otherwise not present a significant fragment hazard. Doors may fail, but they will rebound out of their frames, presenting minimal hazards.	Majority of personnel suffer significant injuries. There may be a few (<10%) fatalities.
Medium	Damaged – repairable. Minor deformations of non-structural elements and secondary structural members and no permanent deformation in primary structural members.	Glazing will break, but will remain in the window frame. Doors will stay in frames, but will not be reusable.	Some minor injuries, but fatalities are unlikely.
High	Superficially damaged. No permanent deformation of primary and secondary structural members or non-structural elements.	Glazing will not break. Doors will be reusable.	Only superficial injuries are likely.

Below AT Standards

(to be avoided)

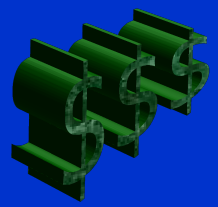
Applicable level of protection provided by minimum standards

Note: For Existing Buildings (Table 2-2) levels of protection are similar but vary slightly – are a little more lenient.

DoD Minimum AT Standards for Buildings ...For New and Existing Buildings

- Standard 1: Minimum standoff distance
- Standard 2: Building separation
- Standard 3: Unobstructed space
- Standard 4: Drive-up / drop-off
- Standard 5: Access roads
- Standard 6: Parking beneath buildings or on rooftops
- Standard 7: Progressive collapse avoidance
- Standard 8: Structural isolation
- Standard 9: Building overhangs
- Standard 10: Exterior masonry walls
- Standard 11: Window and Door Glazing
- Standard 12: Building entrance layout Standard
- Standard 13: Exterior Doors
- Standard 14: Mailrooms
- Standard 15: Roof access
- Standard 16: Overhead mounted Architectural features
- Standard 17: Air intakes
- Standard 18: Mailroom Ventilation
- Standard 19: Emergency air distribution shutoff
- Standard 20: Utility distribution and installation
- Standard 21: Equipment bracing
- Standard 22: Under building access
- Standard 23: Mass notification

DoD Minimum AT Standards for Buildings - Site Planning



Standard 1. Minimum Standoff Distances

- Controlled Perimeter
  - Parking and Roadways
  - Applicable to all inhabited buildings
  - Provides flexibility with existing inhabited buildings
    - Access control to parking areas
    - Eliminate parking on roadways within required standoff
    - Flexible requirements for Family Housing
  - Parking and Roadway Projects
  - Trash Containers

DoD Minimum AT Standards for Buildings - Site Planning

Standard 2. Building Separation

- Billeting and Primary Gathering Buildings
- Other inhabited Buildings

Standard 3. Unobstructed Space

- Ensure a 10 meter (33 feet) clear zone around inhabited buildings not allow concealment of explosive devices 150 mm (6 inches) or greater in height
- Smart location of Electrical and Mechanical Equipment
- Provide equipment enclosures for equipment within unobstructed space

DoD Minimum AT Standards for Buildings Minimum Standoffs Summary

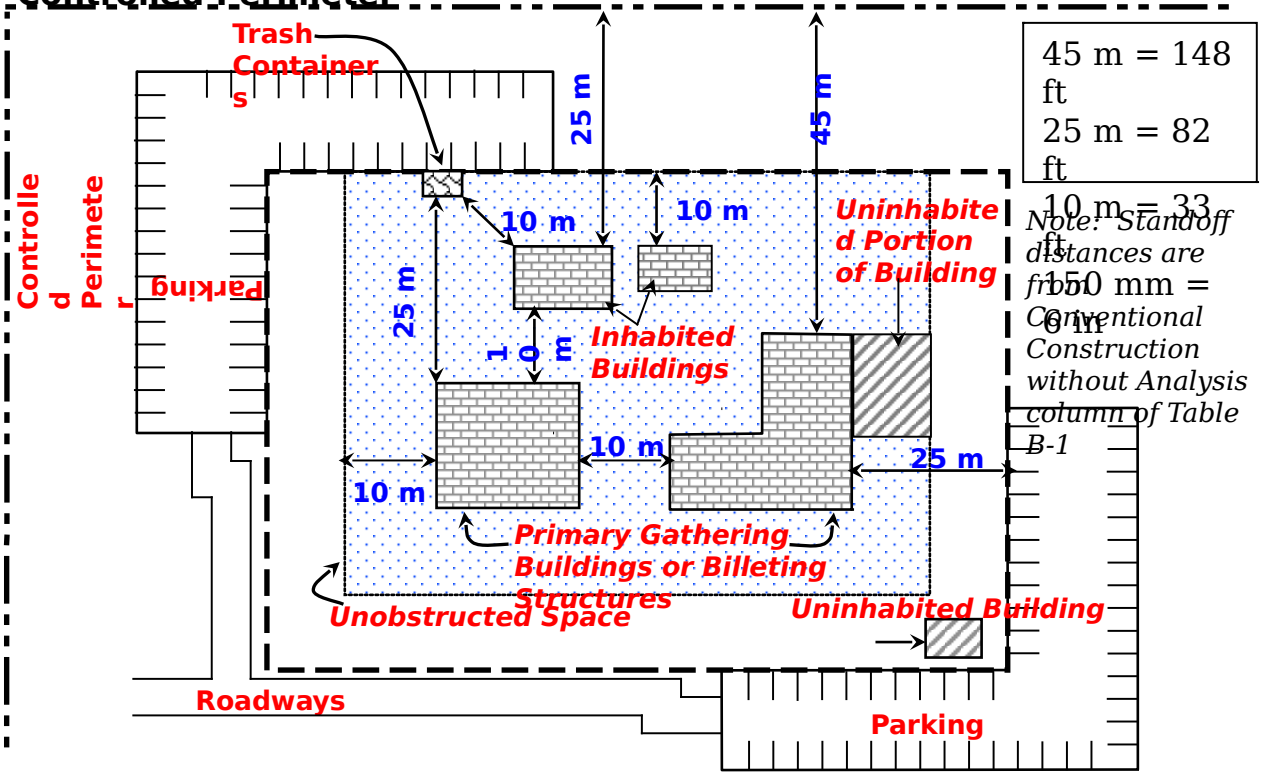
Table B-1 Minimum Standoff Distances and Separation for New and Existing Buildings

Location	Building Category	Standoff Distance or Separation Requirements			
		Applicable Level of Protection	Conventional Construction Standoff Distance	Effective Standoff Distance[1]	Applicable Explosive Weight [2]
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Billeting	Low	45 m [4] (148 ft.)	25 m [4] (82 ft.)	I
	Primary Gathering Building	Low	45 m [4][5] (148 ft.)	25 m [4][5] (82 ft.)	I
	Inhabited Building	Very Low	25 m [4] (82 ft.)	10 m [4] (33 ft.)	I
Parking and Roadways within a Controlled Perimeter	Billeting	Low	25 m [4] (82 ft.)	10 m [4] (33 ft.)	II
	Primary Gathering Building	Low	25 m [4][5] (82 ft.)	10 m [4][5] (33 ft.)	II
	Inhabited Building	Very Low	10 m [4] (33 ft.)	10 m [4] (33 ft.)	II
Trash Containers	Billeting	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Primary Gathering Building	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Inhabited Building	Very Low	10 m (33 ft.)	10 m (33 ft.)	II
Building Separation (for new buildings only)	Billeting	Low	10 m (33 ft.)	No antiterrorism minimum	III [3]
	Primary Gathering Building	Low	10 m (33 ft.)	No antiterrorism minimum	III [3]
	Inhabited Building	Very Low	No antiterrorism minimum	No antiterrorism minimum	Not applicable

(1) Even with analysis, standoff distances less than those in this column are not allowed for new buildings, but are allowed for existing buildings if constructed/retrofitted to provide the required level of protection at the reduced standoff distance.
(2) See UFC 4-010-10, for the specific explosive weights (kg/pounds of TNT) associated with designations – I, II, III. UFC 4-010-10 is For Official Use Only (FOUO)
(3) Explosive for building separation is an indirect fire (mortar) round.
(4) For existing buildings, see paragraph B-1.1.2.2.
(5) For existing family housing, see paragraph B-1.1.2.2.3.

Sitework Standards-Controlled Perimeter

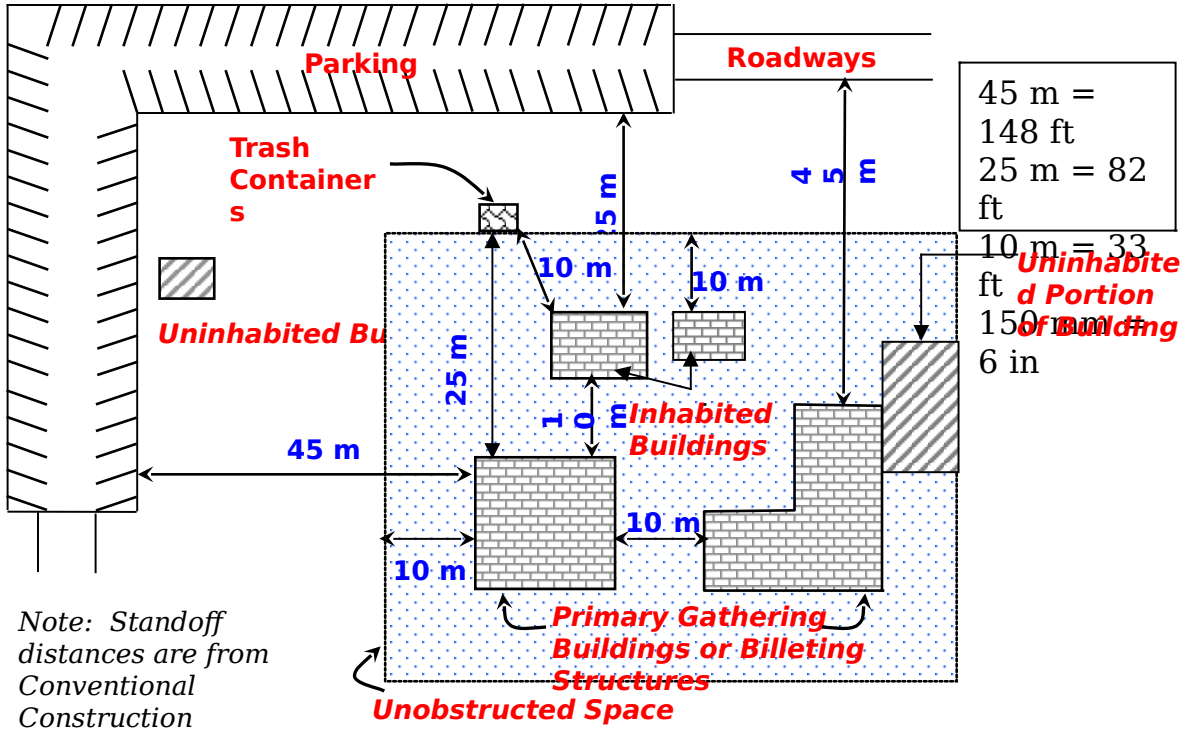
Figure B-1 Standoff Distances and Building Separation – Controlled Perimeter



Absolute Minimum Standoff is 10m for Parking and Roadways; 25m for Installation Perimeter

Sitework Standards- Uncontrolled Perimeter

Figure B-2 Standoff Distances and Building Separation – No Controlled Perimeter

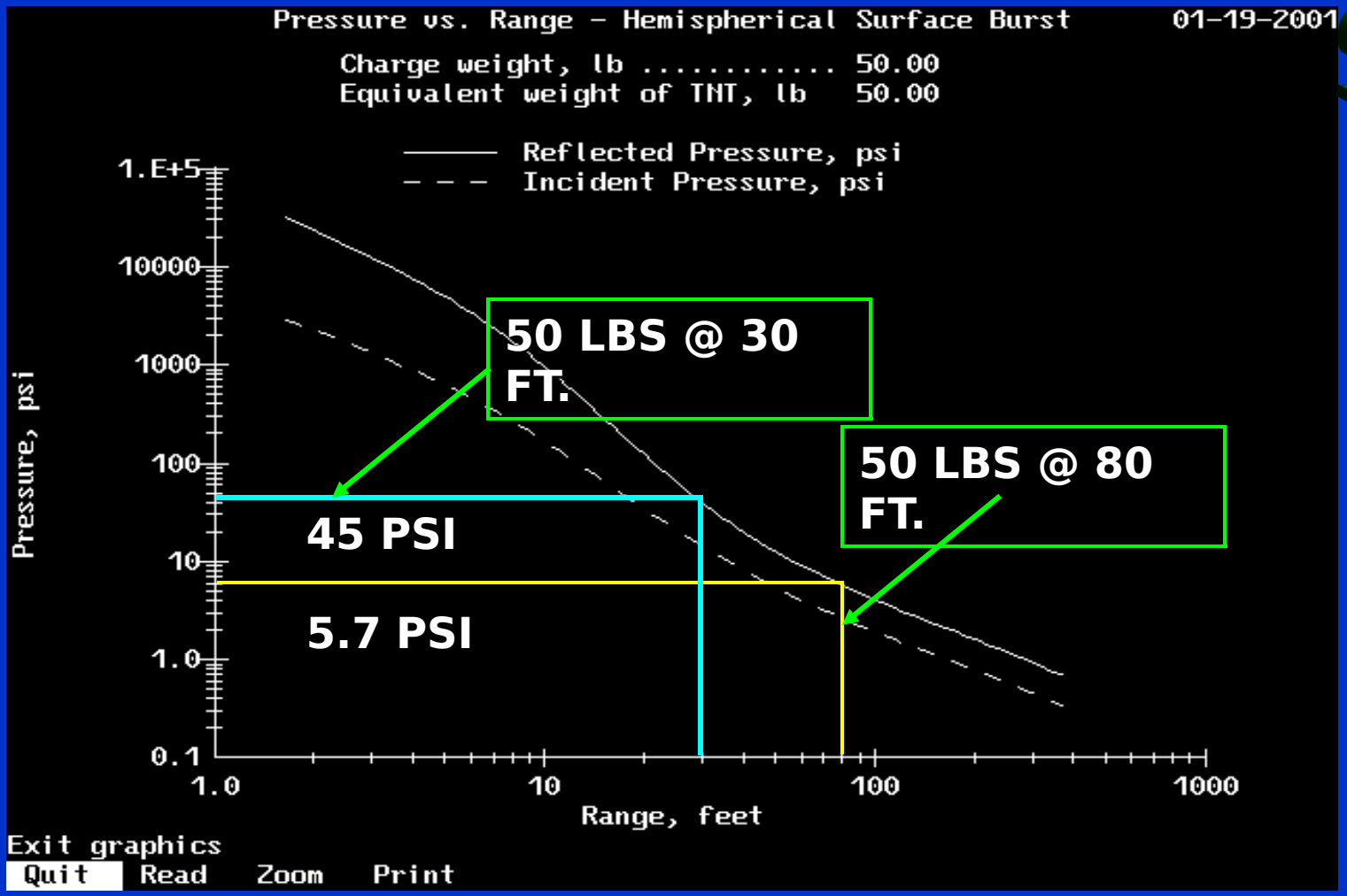


Note: Standoff distances are from Conventional Construction without Analysis column of Table B-1

Absolute Minimum Standoff is 10m for Parking and Roadways; 25m for

Understanding Standoff

- *Blast loads vary with cube of distance to the explosion*



DoD Minimum AT Standards for Buildings Minimum Standoffs Summary

- **Installation Perimeter**
  - 80 Feet to Inhabited (25M)
  - 150 Feet to Billeting (45M)
  - 150 Feet to Primary Gathering (45M)
- **Parking**
  - 30 Feet From Inhabited (10M)
  - 80 Feet From Billeting (25M)
  - 80 Feet From Primary Gathering (25M)
- **Roadway Standoff**
  - 30 Feet From Inhabited (10M)
  - 80 Feet From Billeting (25M)
  - 80 Feet From Primary Gathering (25M)
- **Separation**
  - Trash Containers at 30 Feet From Inhabited (10M)
  - Trash Containers at 80 Feet From Billeting (25M)
  - Trash Containers at 80 Feet From Primary Gathering (25M)
- **Building Separation**
  - 30 Feet for Billeting (10M)
  - 30 Feet for Primary Gathering (10M)

DoD Minimum AT Standards for Buildings - Site Planning

Standard 4. Drive-Up/Drop-Off Areas

- Medical facilities, exchanges, commissaries, child care centers, and schools
- Provide marking
- Do not allow unattended vehicles
- Do not locate drive through/drive-up/drop-off lanes under any inhabited portion of a building

Standard 5. Access Roads

- Where necessary for operation and fire department access, ensure access control measures are implemented.

DoD Minimum AT Standards for Buildings - Site Planning

Standard 6. Parking Beneath Buildings or on Rooftops (of Inhabited Buildings)

- Eliminate parking beneath inhabited building or on rooftops of inhabited building
- Areas with limited real estate:
  - Provide access control
  - Design structural elements (floor/roof) not to fail from the detonation of an explosive device in the parking area
  - Design structure to prevent progressive collapse

DoD Minimum AT Standards for Buildings - Structural Design

Standard 7. Progressive Collapse Avoidance

- Required for building 3 or more stories
- New and Existing buildings
- Design exterior columns and walls to sustain loss of lateral support at any floor level - add one story height to nominal unsupported length
- Analyze structure to ensure it can withstand removal of one primary exterior vertical or horizontal load-carrying element
- Design floors with improved capacity-required for load reversals and uplift-net uplift = dead load + 1/2 live load.

DoD Minimum AT Standards for Buildings - Structural Design

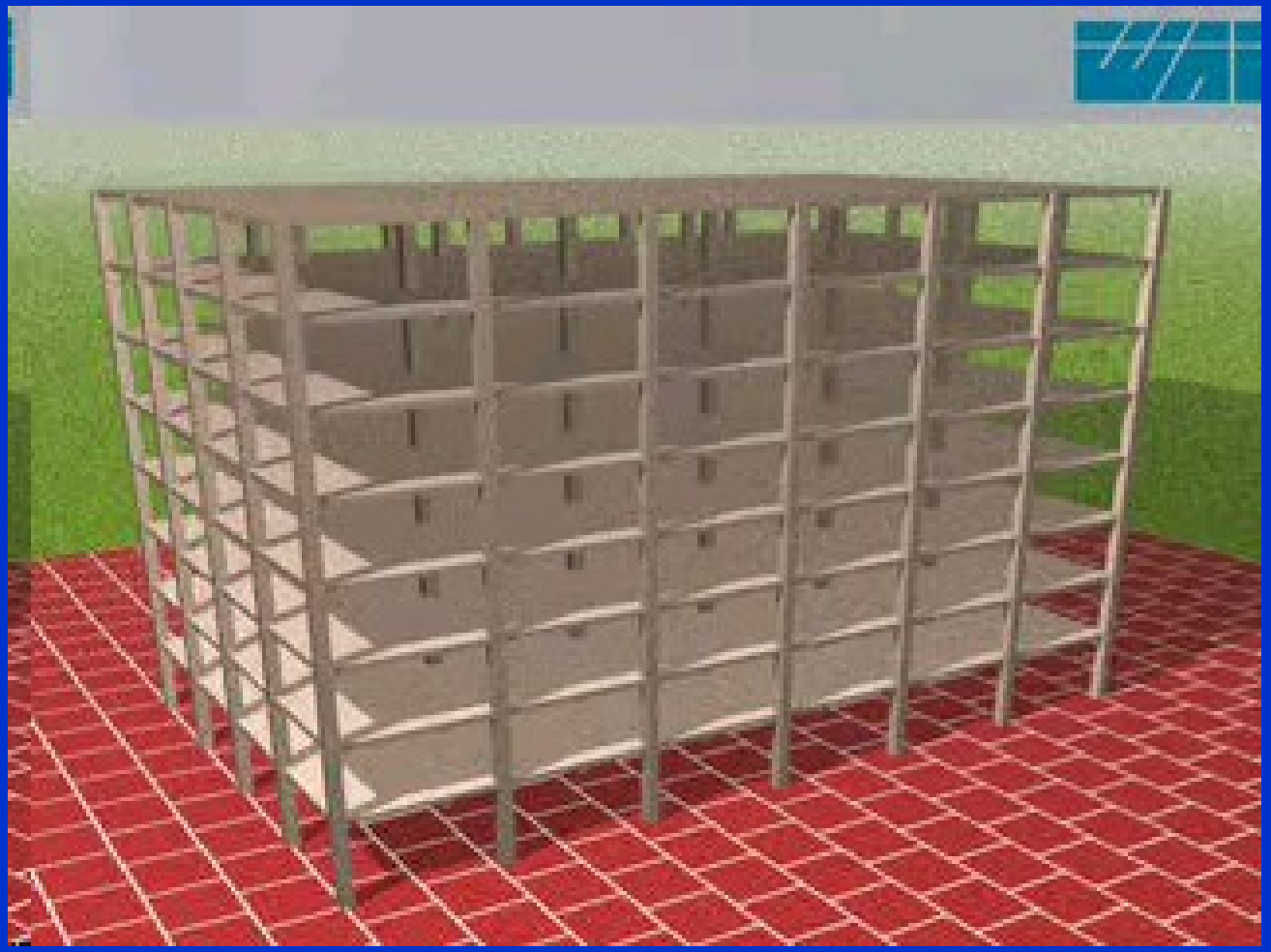
A.P. Murrah Federal Building – Oklahoma City, Oklahoma

Terrorist bomb explosion on April 1995 locally damaged primary supporting columns along the perimeter. The localized damage initiated a series of failures that extended across much of the north face and through the width of the building.

Initiated effort from GSA and others to incorporate progressive collapse provisions in design codes.

DoD Minimum AT Standards for Buildings - Structural Design

HOW PROGRESSIVE COLLAPSE OCCURS



DoD Minimum AT Standards for Buildings - Structural Design

Standard 8. Structural Isolation

- Building Additions
  - Design to be structurally independent from adjacent existing building
  - Alternatively, verify through analysis that collapse of either addition or existing building will not result in collapse of the remainder of building
- Portions of Buildings
  - Areas not meeting inhabited building criteria
  - Design area to structurally independent to minimize possibility of collapse of uninhabited areas that will affect stability of inhabited portion
  - Not mandatory for existing, implement where possible

DoD Minimum AT Standards for Buildings - Structural Design

Standard 9. Building Overhangs

- No parking and roadway allowed under overhangs
- Ensure floors beneath an inhabited area will not fail from detonation of an explosive device underneath overhang
- Design structural elements within and adjacent to overhang for prevention of progressive collapse

Standard 10. Exterior Masonry Walls

- Unreinforced Masonry is prohibited
- Provide minimum of 0.05 percent vertical reinforcing with a maximum spacing of 1200mm (48 inches)

Antiterrorism and Force Protection Considerations in Facility Design

DoD Minimum AT Standards for Buildings - Architectural Design

Standard 11. Windows and Glazed Doors

- Use minimum of 6mm (1/4 inch) laminated glass
- Two 3mm (1/8 inch) panes bonded together with 0.75mm (0.030 inch) polyvinyl-butyral (PVB) interlayer
- Provide aluminum or steel frames
  - Resist a static load of 1 lb per square inch
  - Deformation not to exceed 1/160 of unsupported member length
  - Design frame connections for ultimate loading - tension force of 200 lbs/inch and shear force of 75 lbs/inch
- Where standoffs cannot be met - provide for an equivalent level of protection
- Replace existing windows meeting the above requirements during replacement projects

DoD Minimum AT Standards for Buildings - Architectural Design

- Note Additional Combinations for Insulated Glass Syst

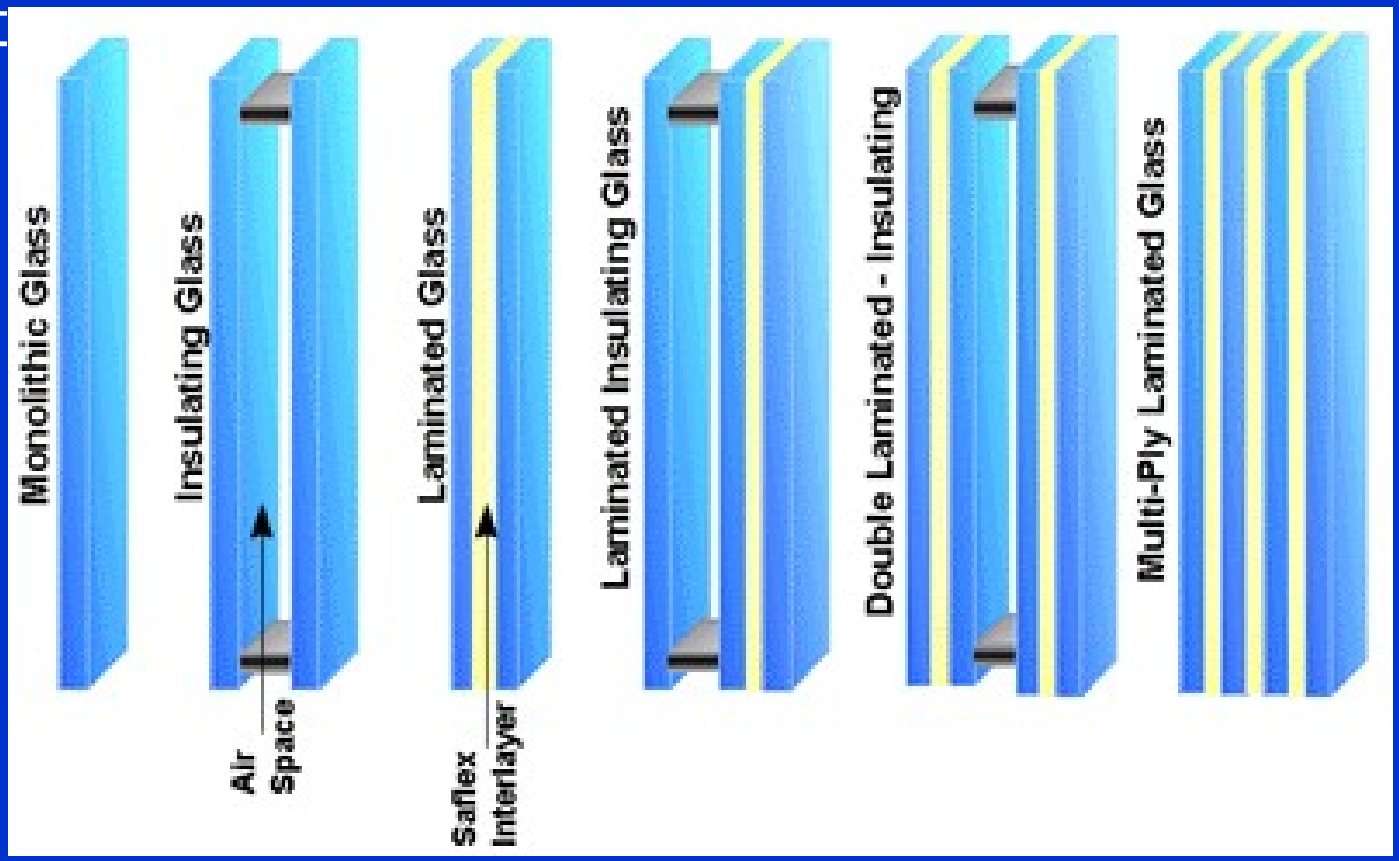


Illustration of Glazing Sections

DoD Minimum AT Standards for Buildings - Architectural Design

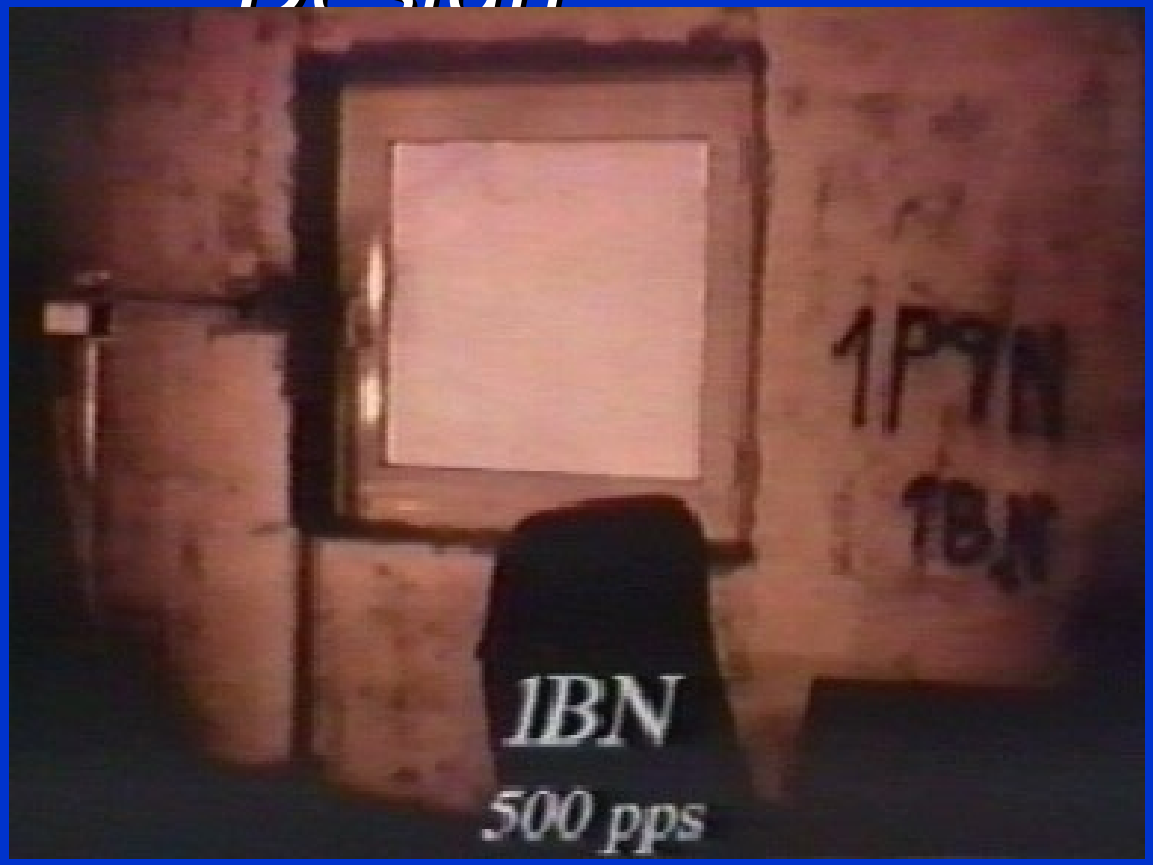
Normal Windows Present Hazard

DoD Minimum AT Standards for Buildings - Architectural Design

- Note Glazing Performs Acceptably, Glass Remains on Film
- However, Glazing Anchorage Fails

Glazing Anchorage Failure

DoD Minimum AT Standards for Buildings - Architectural Design



Video Courtesy of Arpal

- Note Glazing Performs Acceptably, Glazing Remains In Frame
- However, Entire Window Launches at High Velocity

Frame Anchorage Failure

DoD Minimum AT Standards for Buildings - Architectural Design

Blast Resistant Windows

DoD Minimum AT Standards for Buildings - Architectural Design

Video Courtesy of Arpal

- Note Glazing Performs Acceptably, Glazing Remains In Frame
- Limited Glass Fragments into Interior
- Frame Remains Attached to Wall

Desired Performance

DoD Minimum AT Standards for Buildings - Architectural Design

Standard 12. Building Entrance Layout

- New Buildings
  - Ensure main entrance does not face installation perimeter or other uncontrolled vantage points with a direct line of site
- Existing Buildings
  - Provide for or use a different entrance as the main entrance
  - Provide screening of the main entrance to limit ability of potential aggressors to target personnel entering and leaving the building

Standard 13. Exterior Doors

- Ensure all exterior doors open outwards

DoD Minimum AT Standards for Buildings - Architectural Design

Standard 14. Mailrooms

- Locate mailrooms on perimeter of building
- Locate as far as possible from heavily populated areas of the building and critical infrastructure/utilities
- Standards provide for facilitating future upgrades, limits collateral damage and injuries, and reduces dissemination of hazardous agents.

Standard 15. Roof Access

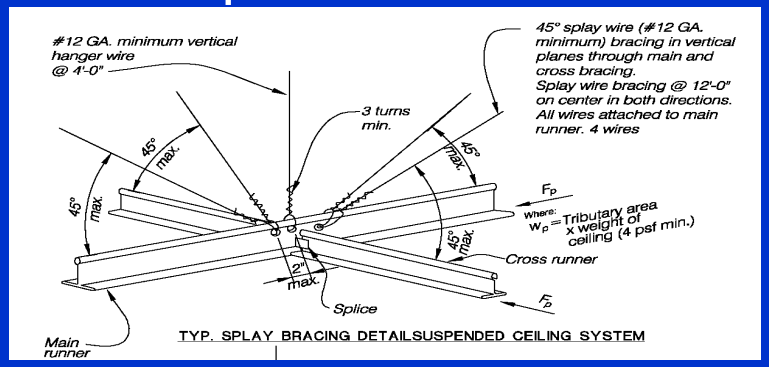
- Control access to roof
- Access control minimizes possibility of placement of explosives or chemical, biological, or radiological agents

Antiterrorism and Force Protection Considerations in Facility Design

DoD Minimum AT Standards for Buildings - Architectural Design

Standard 16. Overhead Mounted Architectural Features

- Ensure overhead mounted features weighing 30 pounds or more are mounted to minimize the likelihood of falling and injuring building occupants
- Mounting to resist 0.5 component weight in any direction and 1.5 component weight in vertical direction
- Does not preclude requirements of other criteria.


#12 GA. minimum vertical hanger wire @ 4'-0"
45° splay wire (#12 GA. minimum) bracing in vertical planes through main and cross bracing. Splay wire bracing @ 12'-0" on center in both directions. All wires attached to main runner. 4 wires
3 turns min.
45° max.
45° max.
45° max.
45° max.
F_p
where: W_p = Tributary area x weight of ceiling (4 psf min.)
Cross runner
2" max.
Splice
F_p
Main runner
TYP. SPLAY BRACING DETAILSUSPENDED CEILING SYSTEM

DoD Minimum AT Standards for Buildings - Elec/Mech Design

Standard 17. Air Intakes

- New Buildings
  - Locate all air intakes at least 3 meters (10 feet) above the ground
- Existing Buildings
  - The above requirement of new buildings is recommended, but not mandatory

Standard 18. Mailroom Ventilation

- Provide separate, dedicated air ventilation systems for mailrooms

DoD Minimum AT Standards for Buildings - Elec/Mech Design

Standard 18. Mailroom Ventilation – cont'd

- Provide dedicated exhaust systems within mailrooms to maintain slight negative air pressures with respect to the remainder of the building
- Provide mailroom ventilation system outside air intakes and exhausts with low leakage isolation dampers
- Provide separate switches or methods of control to isolate mailrooms during an event

Standard 19. Emergency Air Distribution Sh

- For new and existing inhabited buildings, provide an emergency shutoff switch in HVAC control system
- Provide access to facility or building security manager

DoD Minimum AT Standards for Buildings - Elec/Mech Design

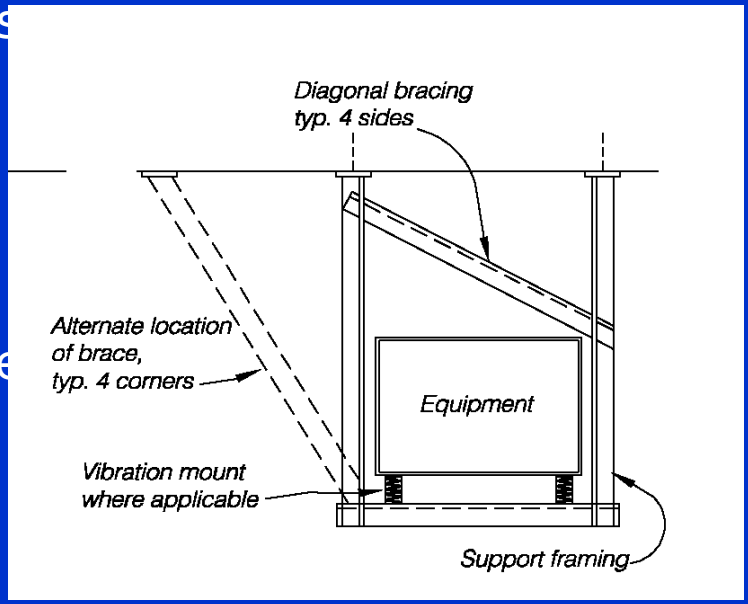
Standard 20. Utility Distribution and Installation

- Utility Routing - Do not route critical or fragile utilities on exterior walls or on walls shared with mailrooms
- Redundant Utilities - Ensure such utilities are not collocated or do not run in the same chases as primary utilities
- Emergency Backup Systems - Ensure such systems are located away from system components for which they provide backup

DoD Minimum AT Standards for Buildings - Elec/Mech Design

Standard 21. Equipment Bracing

- Mount all overhead utilities and fixtures
  - 30 pounds or more
  - Mounting to resist 0.5 times equipment weight in an lateral direction
  - Mounting to resist 1.5 times equipment weight in vertical direction
- Does not preclude requirements of othe criteria.



DoD Minimum AT Standards for Buildings - Elec/Mech Design

Standard 22. Under Building Access

- Ensure access control to crawl spaces, utility tunnels, and other means of building access

Standard 23. Mass Notificati

- New buildings
  - Capable of providing real-time emergency information to building occupants or personnel
- Existing buildings
  - Above requirement for new buildings mandatory for primary gathering buildings and billet inhabited buildings

UFC 4-021-01

Now Available

DoD Minimum AT Standards for Buildings -- Recommendations

..... For New and Existing Buildings

- Recommendation 1: Vehicle access points
- Recommendation 2: High speed vehicle approaches
- Recommendation 3: Vantage points
- Recommendation 4: Drive-up / drop-off
- Recommendation 5: Building location
- Recommendation 6: Railroad location
- Recommendation 7: Access Control points for family housing
- Recommendation 8: Standoff for family housing
- Recommendation 9: Minimize secondary debris
- Recommendation 10: Structural Redundancy
- Recommendation 11: Internal Circulation
- Recommendation 12: Visitor Control
- Recommendation 13: Asset location
- Recommendation 14: Room layout
- Recommendation 15: External hallways
- Recommendation 16: Windows

DoD Minimum AT Standards for Buildings -Recommendations

Site Planning

1. Vehicle Access Points
   - Minimize number at perimeter, parking areas, and at drive-up/drop-off
2. High-Speed Vehicle Approaches
   - Avoid vehicle approaches perpendicular to inhabited buildings
3. Vantage Points
   - Eliminate or screen direct line of sight vantage points

DoD Minimum AT Standards for Buildings -Recommendations

Site Planning

4. Drive-Up/Drop-Off
   - Locate drive-up areas away from large glazed areas and away from the main entrance
   - Coordinate with building geometry

5. Building Location
   - Maximize separation distance of inhabited buildings and large visitor population

DoD Minimum AT Standards for Buildings -Recommendations

Site Planning

6. Railroad Location
   - Avoid siting inhabited buildings close to railroads
7. Access Control to Family Housing
   - Provide space for controlling access at perimeter when need arise
8. Standoff for Family Housing
   - Maintain a minimum standoff distance of 25 meters (82 feet) from installation perimeter
9. Minimize Secondary Debris
   - Eliminate unrevetted barriers and site furnishings

DoD Minimum AT Standards for Buildings -Recommendations

Structural and Architectural Design

10. Structural Redundancy
    - Utilize highly redundant structural systems: Moment resisting frame
    - Detail connections to provide continuity and provide for large displacements without complete loss of strength
11. Internal Circulation
    - Design circulation to provide visual detection and monitoring of unauthorized personnel

DoD Minimum AT Standards for Buildings -Recommendations

Structural and Architectural Design

12. Visitor Control
    - Isolate visitor areas from sensitive or critical areas, area where high-risk or mission critical personnel are located
    - Isolate from areas with large population of DoD personnel
13. Asset Location
    - Locate critical assets and mission-critical or high-risk personnel away from building exterior

DoD Minimum AT Standards for Buildings -Recommendations

Structural and Architectural Design

14. Room Layout
    - Position personnel and critical equipment to minimize exposure to direct blast effects and potential impacts from hazardous debris
15. External Hallways
    - Avoid exterior hallway configurations for inhabited structures.
16. Windows
    - Minimize the number and size of windows for new construction

DoD Minimum AT Standards for Buildings

Challenges

- Limited space for standoff
- Additional cost
- Limited Flexibility – Very Difficult Waiver Approval Process
- Trained project team
- Effective security operations

TOPICS

1. Background of DoD Standards
2. Criteria and Guidance
3. DoD Minimum AT Standards for Buildings
4. Site Development Issues and Examples
5. Questions

Site Development Issues and Examples

1. Background
2. Example 1 - Waterfront
3. Example 2 – Facility Issues
4. Example 3 – New Triggers

TOPICS

1. Background
2. Example 1 - Waterfront
3. Example 2 – Facility Issues
4. Example 3 – New Triggers

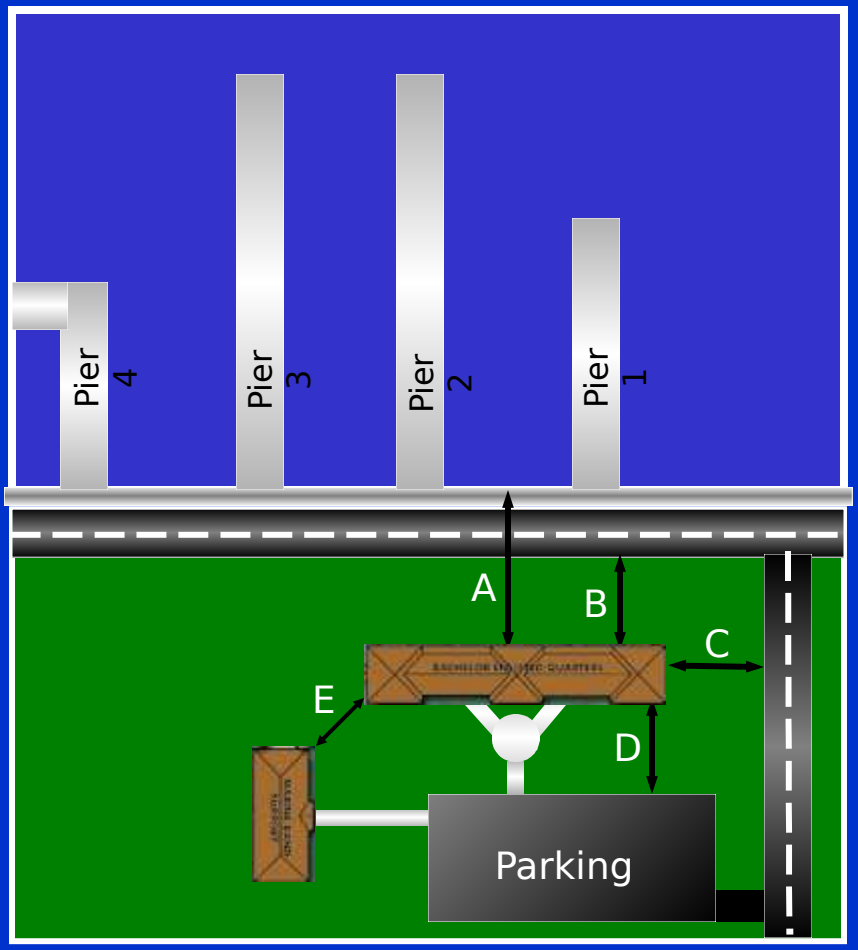
Background

- The Following Examples Are Designed to Reinforce Concepts from the DOD Minimum AT Standards for Buildings
- Many of the Examples are Based on Frequently Asked Questions Concerning Application of the Criteria

TOPICS

1. Background
2. Example 1 - Waterfront
3. Example 2 – Facility Issues
4. Example 3 – New Triggers

Example 1- Waterfront



A = 35 m

B = 25 m

C = 25 m

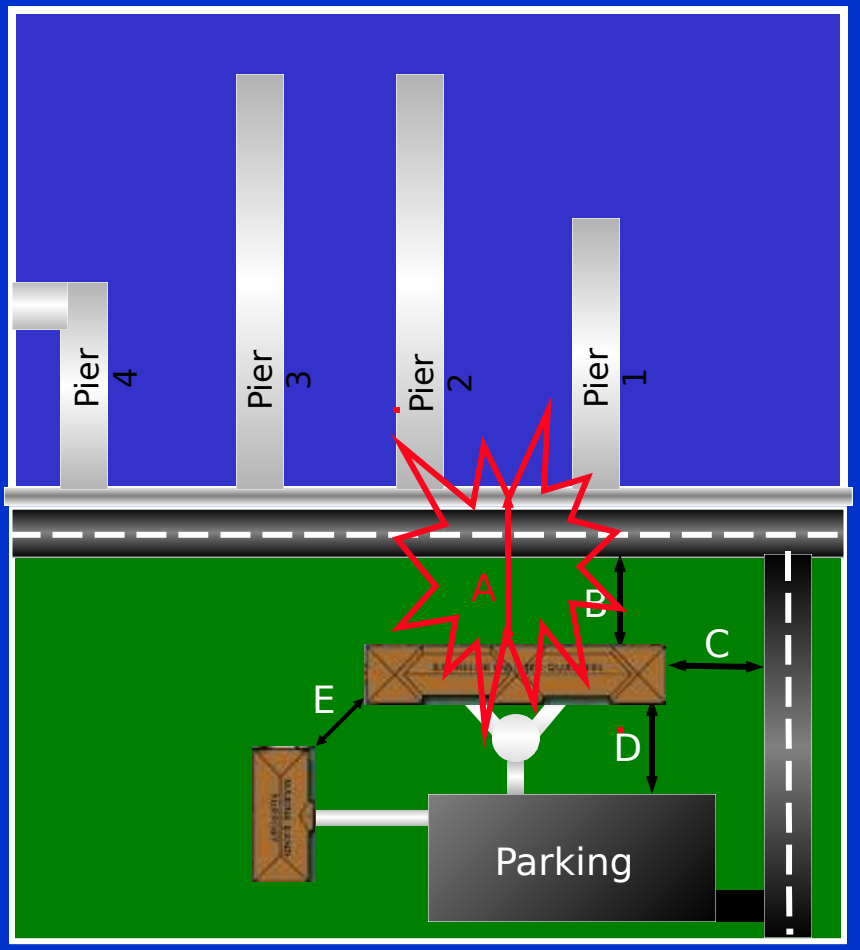
D = 25 m

E = 20

- Identify Any Potential Standoff Distance Violations
- Propose Solutions

Both Facilities Are New and Considered Primary Gathering Facilities

Example 1- Waterfront



A = 35 m

B = 25 m

C = 25 m

D = 25 m

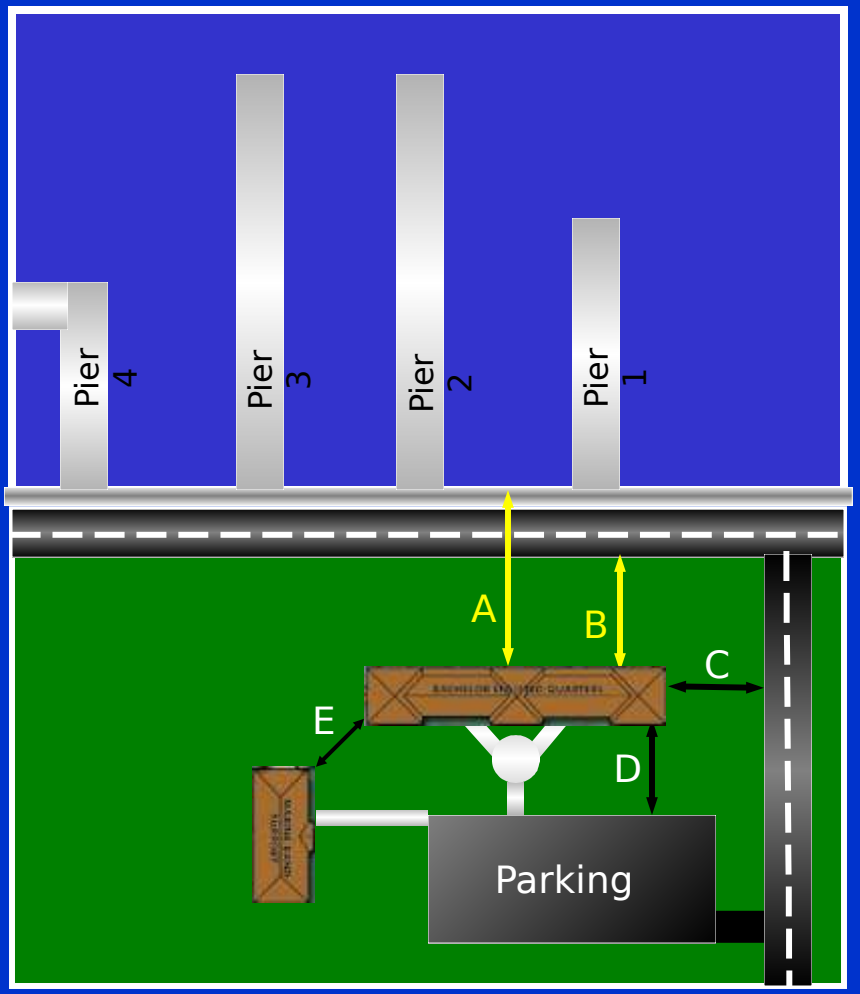
E = 20

- Issue:
  - Standoff Distance to the Waterfront Perimeter is Violated
  - Min. Std. Requires 45 meters

Example 1- Waterfront

- Where a Controlled Perimeter Includes a Shoreline and There is No Defined Perimeter Beyond the Shoreline, the Boundary will be the Mean High Water Mark
- What are Potential Solutions?

Example 1- Waterfront



A = 45 m

B = 35 m

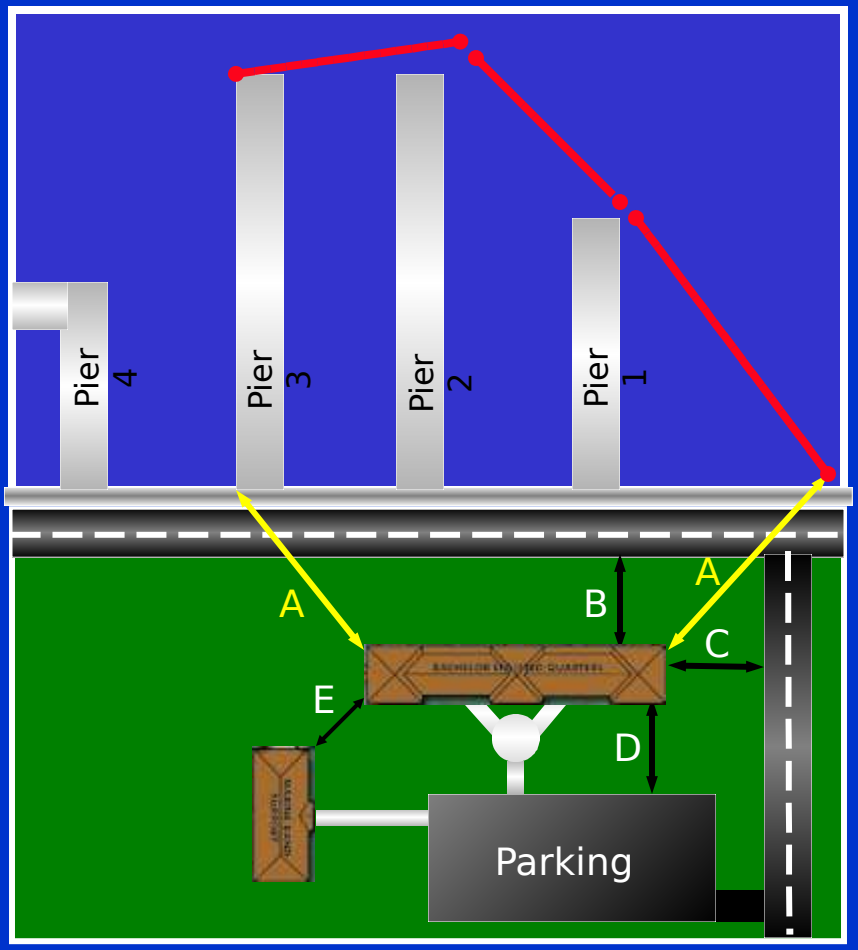
C = 25 m

D = 25 m

E = 20

- **Solution 1**
  - If Possible, Shift Site in Order to Increase Perimeter Standoff Distance

Example 1- Waterfront



A > 45 m

B = 25 m

C = 25 m

D = 25 m

E = 20 m

- **Solution 2 –**
  - Often Site Constraints Do not Offer Opportunity for Additional Land
  - Provide Perimeter Water Barrier to Insure >45 m Standoff

Waterfront Barriers

- More Information on Port Security and Waterfront Barrier Systems Available by Contacting the Naval Facilities Engineering Service Center (NFESC)

TOPICS

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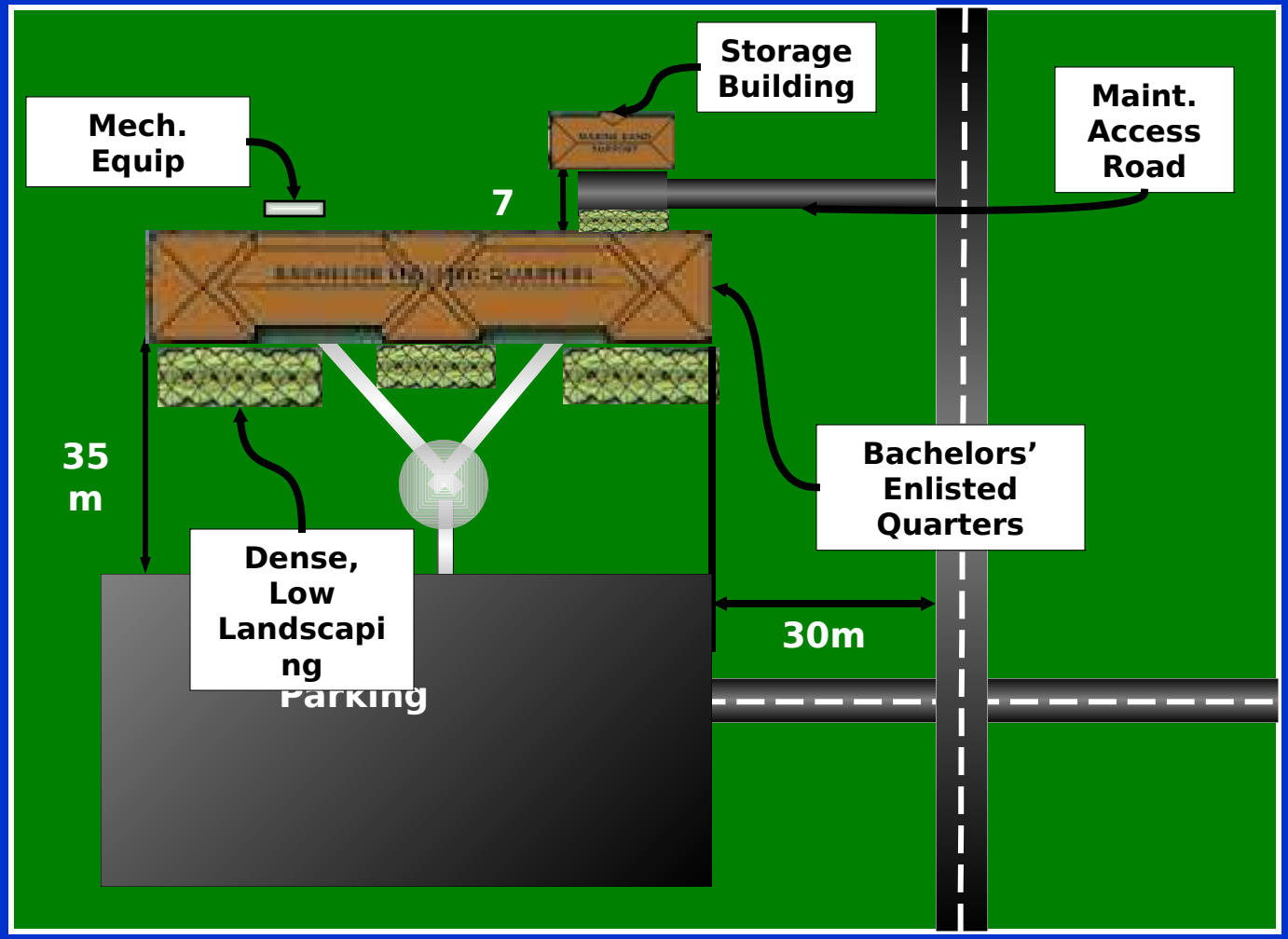
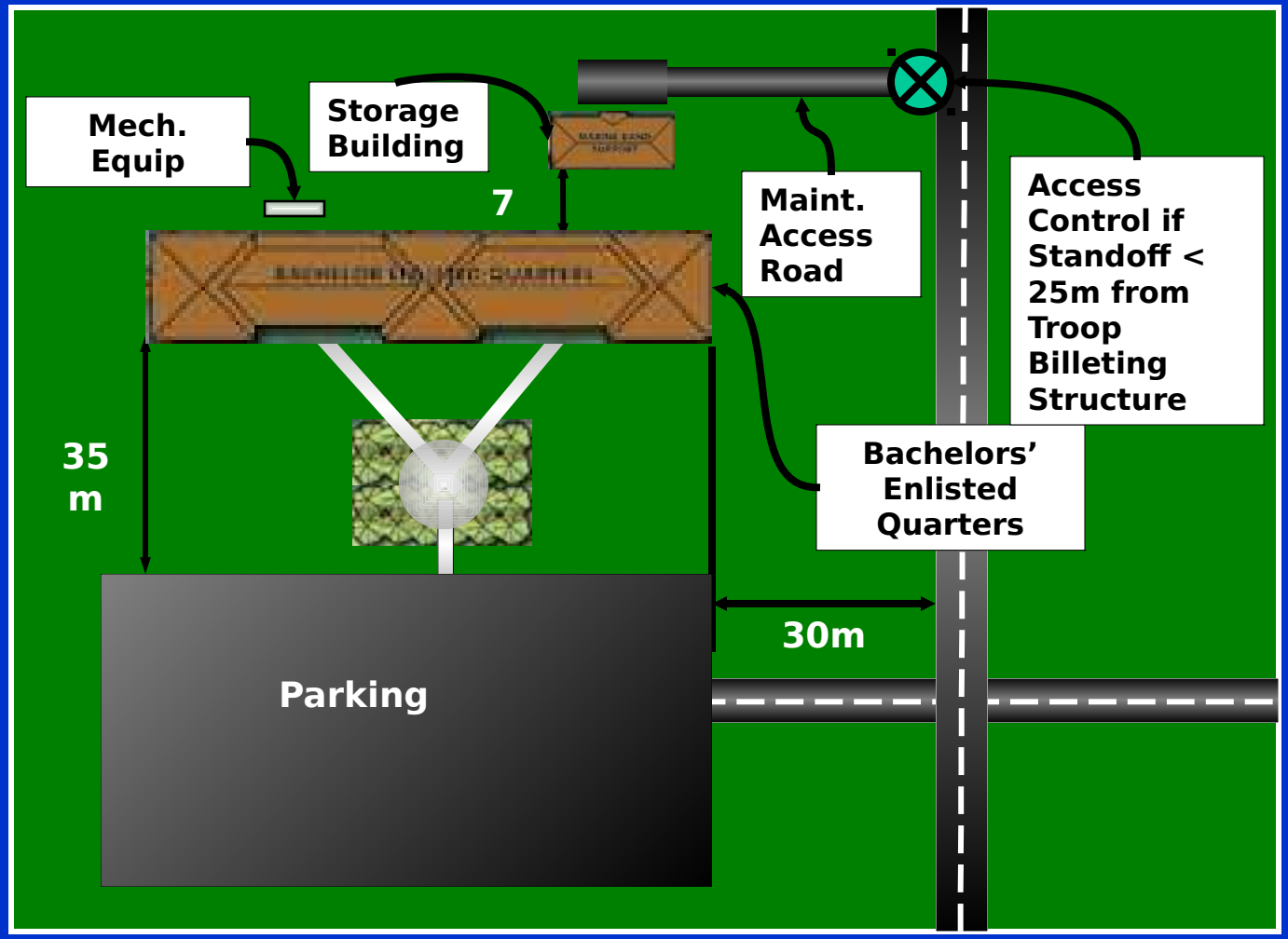
Example 2- Facility Issues



Example 2 – Facility Issues

- Potential Issues
  - Unobstructed Space Concerns
    - Landscaping?
    - Mechanical Equipment?
  - Access Road to Maintenance Building?
  - Building Separation?

Example 2- Facility Issues



Example 2 – Facility Issues

- Access Roads
  - Maximize Standoff Distance
  - Minimum Standards Require Access Control Measures to be Implemented to Prohibit Unauthorized Vehicles from Using Access Roads Within the Applicable Standoff Distances
- Access Control
  - Combination of Barriers, Gates, Electronic Security Equipment, and/or Guards That Can Deny Entry to Unauthorized Vehicles

Example 2 – Facility Issues

- Unobstructed Space
  - Landscaping Moved to Flag Plaza to Maintain 10 meter Unobstructed Space
  - Storage Building Does Not Violate Requirement
  - Mechanical Equipment, May or May Not be a Concern
    - Preferred Location is Outside Unobstructed Space, However Placement In Original Location is Not Precluded if it Provides No Opportunity for Concealment

Example 2 – Facility Issues

- Building Separation
  - Minimum Standards Require Building Separation Between Primary Gathering or Troop Billeting Facilities and other Inhabited Buildings
  - Since Storage Building is Considered Un-Inhabited the Requirement Does Not Apply
    - Therefore, Current Plan for 7 meter Building Separation Distance is Acceptable

Also, Note That The Requirement Doesn't Apply to Inhabited Buildings Other than Primary Gathering or Troop Billeting

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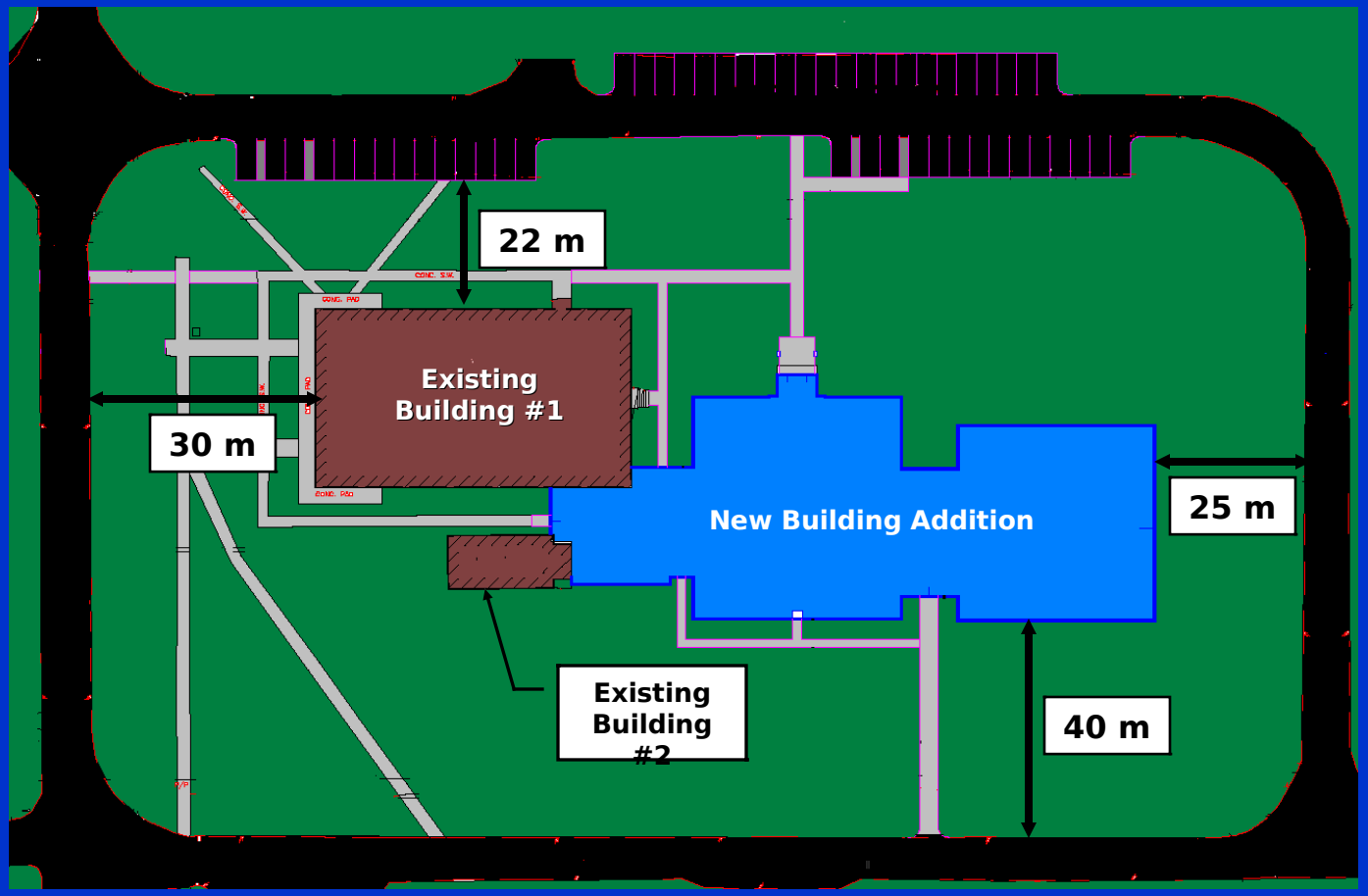
Example 3 – New Triggers



Existing Building #1 – Primary Gathering (12,000 SQ.FT.)

Existing Building #2 – Uninhabited / Storage (3,000 SQ.FT.)

New Building Addition – Primary Gathering (30,000 SQ.FT.)

Example 3 – Facility Issues

- What Do The Minimum Standards Require for This Scenario?
  - Impact For New Building Addition?
  - Impact For Existing Building #1?
  - Impact For Existing Building #2?
- The New Standards Have A Significantly Different Impact Compared to the Interim Standards

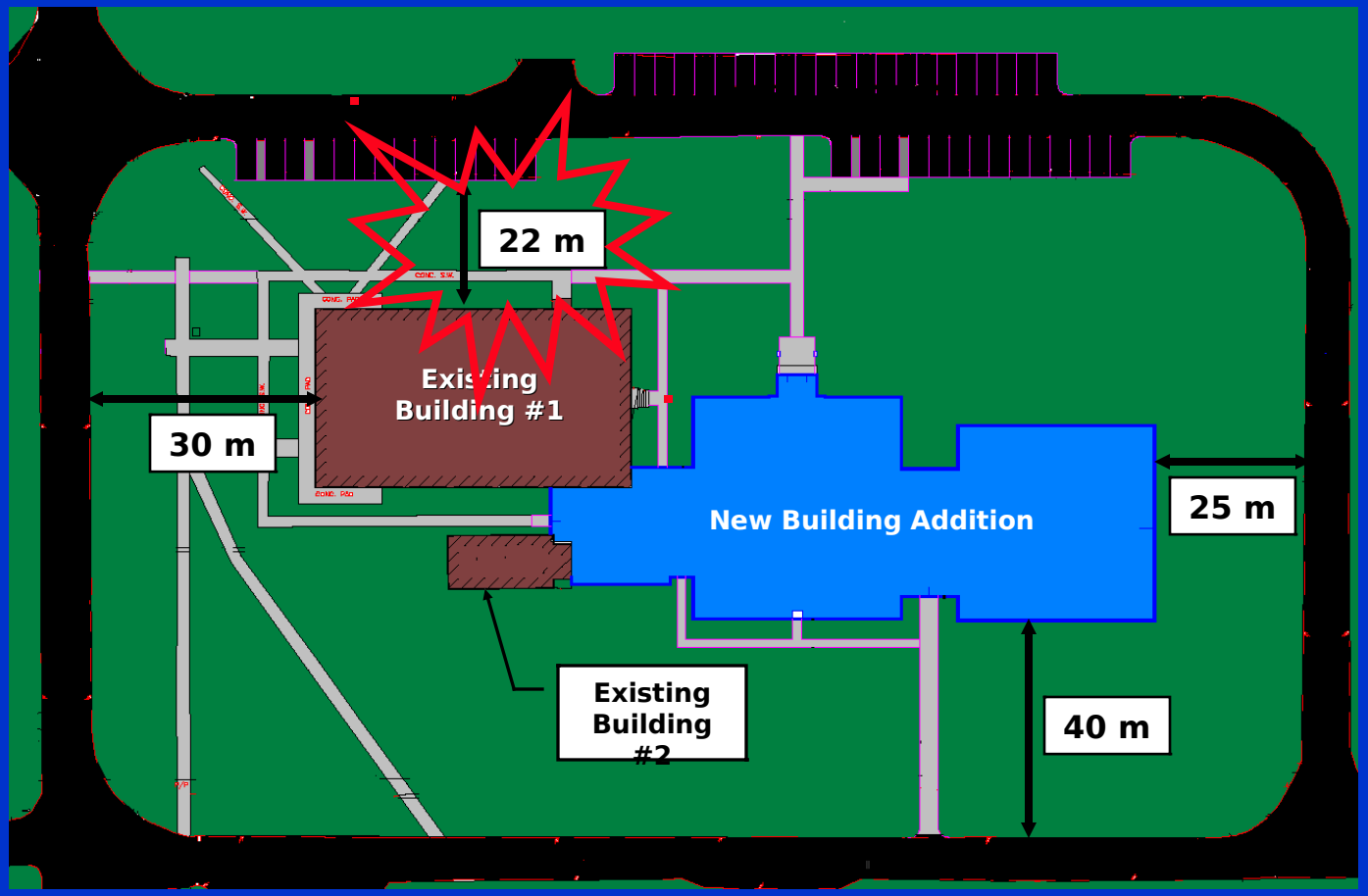
Example 3 – Facility Issues

- New Building Addition
  - The New Addition is Considered New Construction
  - This Addition Meets the Minimum Standoff Distances for a Primary Gathering Facility
  - Therefore, the Remaining Minimum Measures Required in DOD Min. AT Standards for Buildings Should be Incorporated
    - Windows, Equipment Bracing, HVAC Shutoff, etc.

Example 3 – Facility Issues

- Existing Building #1
  - The Square Footage of the New Addition is Greater than 50% of the Square Footage of the Existing Building
  - In Accordance with the New Standards, the Existing Building Must Be Upgraded to Meet the Minimum Standards
  - The Minimum Standoff Distance to Parking is Not In Compliance

Example 3 – New Triggers



Existing Building #1 – Primary Gathering (12,000 SQ.FT.)

Existing Building #2 – Uninhabited / Storage (3,000 SQ.FT.)

New Building Addition – Primary Gathering (30,000 SQ.FT.)

Example 3 – Facility Issues

- Solution Existing Building #1
  - Eliminate the Parking, **OR**
  - The Structure Will Be Hardened to Provide the Required Level of Protection from the Design IED
  - The Remaining Measures Required in Appendix B of the New Standards Should be Incorporated
    - Windows, Equipment Bracing, HVAC Shutoff, Structural Separation,etc.

Example 3 – Facility Issues

- Solution Existing Building #2
  - The Building is Considered Un-Inhabited, Therefore the Criteria Doesn’t Apply
  - B-2.2.1 requires that new building addition should be designed to be structurally independent from the adjacent existing building

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Questions